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**Notes on Mexican Herpetofauna 28:
Associations of Herpetofauna with Mangrove Forests
in the Municipalities of Aldama and Soto La Marina, Tamaulipas, Mexico**

David Lazcano^{1*}, Silvana Pacheco-Treviño², Javier Banda-Leal¹, William L. Farr³ and Alan Kardon⁴

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Abstract

We monitored herpetological activity in the mangrove forest during various field trips to Aldama and Soto La Marina, Tamaulipas, Mexico, 1996–2015. We observed the presence of 8 species of amphibians and 24 of reptiles found around or in the mangrove forest. The forest is composed mainly of *Rhizophora mangle* (Red Mangrove / *Mangle Rojo*) as are most mangrove forests in Mexico. Also present are *Laguncularia racemosa* (White Mangrove / *Manglar Blanco*), *Avicennia germinans* (Black Mangrove / *Mangle Negro*) and *Conocarpus erectus* (Buttonwood / *Mangle Botoncillo*) in different proportions, making up this uniquely complex plant community. The herpetofaunal relationships remain partly unknown. Many years will be needed to complete the survey and add diversity and richness indexes for the herps within the mangrove forest.

Resumen

La actividad herpetológica fue monitoreada dentro del bosque de mangle durante varios viajes de campo a Aldama y Soto La Marina, Tamaulipas, México desde 1996-2015. Observamos las presencias de 8 especies de anfibios y 24 de reptiles, que se encontraron alrededor de o activos dentro del bosque de mangle, estos bosques particulares se componen principalmente de *Rhizophora mangle* (Red Mangrove / *Mangle Rojo*) y este es el caso de la mayoría de bosques de manglares en México. Se combinan en diferentes proporciones con *Laguncularia racemosa* (White Mangrove / *Manglar Blanco*), *Avicennia germinans* (Black Mangrove / *Mangle Prieto*) y *Conocarpus erectus* (Buttonwood / *Mangle Botoncillo*), formando una de las comunidades vegetales muy complejas. La relación entre la herpetofauna sigue siendo en gran parte desconocida. Para lograr este varios años son necesarios para completar los muestreos y agregar índices de diversidad y riqueza de la herpetofauna dentro de los bosques de mangle.

Introduction

Mangrove forests are woody, dense, bushy or arborescent formations from 2 to 25 m in height, consisting of one or more species of mangrove with little presence of herbaceous species (Rzedowski, 1978). Mangroves play an important role in the ecology of tropical coasts and provide many benefits for humans. The roots offer protection for commercially valuable aquatic species like oysters and some fish; the wood is used for construction and fuel (firewood) (Tovilla-Hernández et al., 2001). Ecologically mangroves act as breeding grounds for many species of fish, crustaceans and mollusks, help to fix and hold soil, preventing erosion of the coast, act as a physical barrier protecting against hurricanes, and improve water quality, functioning as a biological filter (Jiménez, 2012). Hogarth (2015) documents the importance of the mangroves and their complicated relationship with the environment.

Mangrove plant communities are widely distributed along

the coastlines of the tropics. They develop in the transition zone between marine and terrestrial ecosystems on the shorelines of coastal lagoons, sheltered bays and river mouths, where there are areas of influence by sea water. Mexico, Indonesia, Brazil, Nigeria, Australia and Malaysia are the six countries with the largest areas of this ecosystem. The mangroves in Mexico represent 5% of the world total, in fourth place out of the 125 countries and territories that have this ecosystem (Spaulding et al., 2010). Mangroves are found in Mexico both on the Atlantic and Pacific coasts.

Six species of mangrove have been reported from Mexico, of which four dominate: *Rhizophora mangle* (Red Mangrove / *Mangle Rojo*), *Laguncularia racemosa* (White Mangrove / *Mangle Blanco*), *Avicennia germinans* (Black Mangrove / *Mangle Prieto*) and *Conocarpus erectus* (Buttonwood / *Mangle Botoncillo*). Two species of mangrove are typically found in the states of Oaxaca and Chiapas: *Avicennia bicolor* (Black Mangrove / *Mangle Salado*) and *Rhizophora harrisonii* (Harrison's

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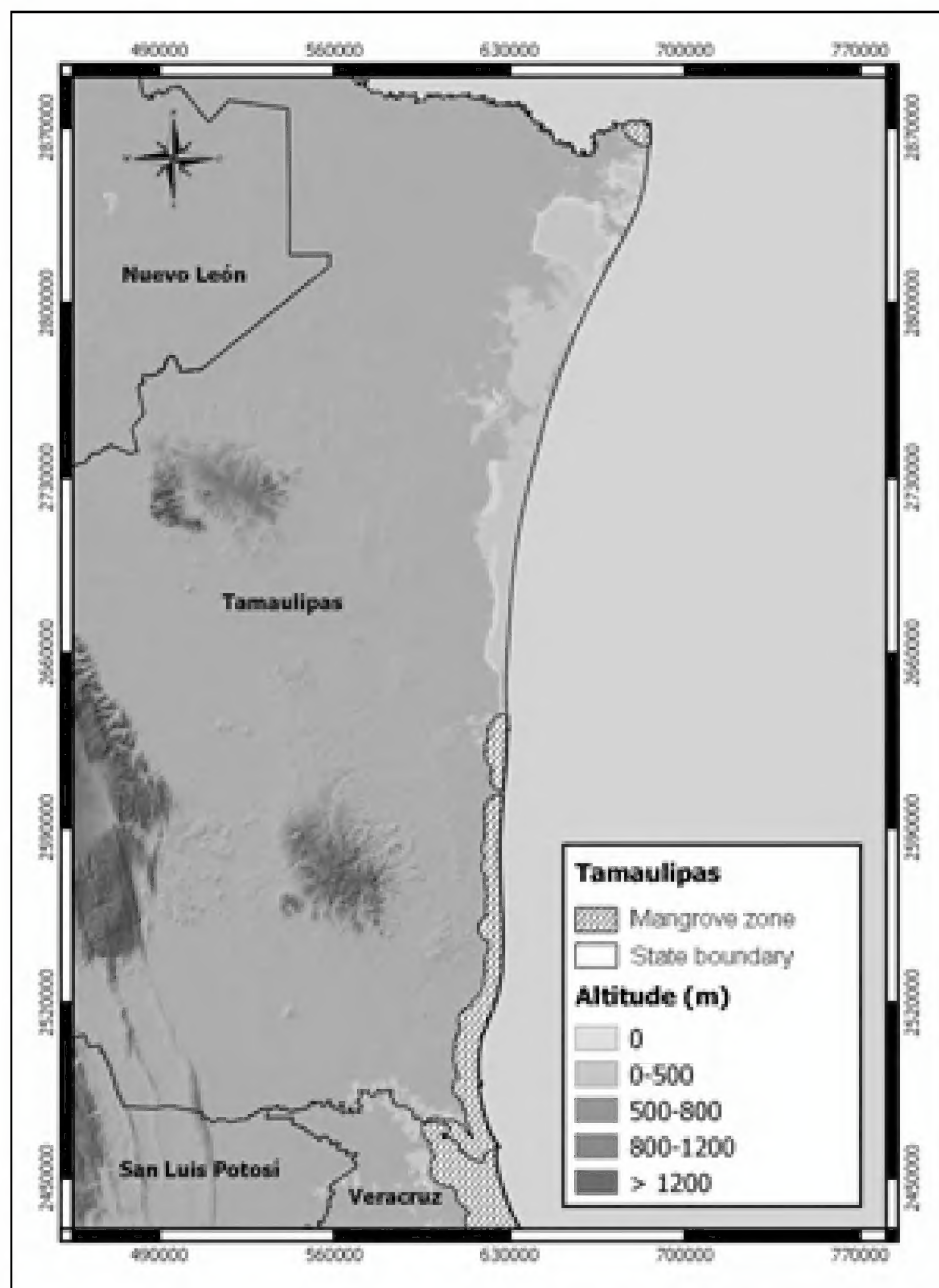


Figure 1. Extent of coastal mangrove swamps in the Mexican state of Tamaulipas.

Mangrove / *Mangle Caballero*) (López-Portillo and Ezcurra, 2002; Nettel et al., 2008). Mangroves can tolerate large changes in water level and salinity by virtue of their aerial roots that allow the plant to capture oxygen from the air. The underground roots are in soils with little oxygen (Tomlinson, 1986; Kathiresan and Bingham, 2001). *Rhizophora mangle* is the most common species, forming the most deeply submerged communities that undergo large water level changes and high salinity. This species has arched roots, which may be anchored under a layer of water up to 1–1.5 m deep. *Laguncularia* may accompany *Rhizophora*, although it usually develops in shallow-water sites. *Avicennia* forms low forest or scrub along a strip located more inland in mostly emergent soils, which are only infrequently flooded. *Conocarpus* occupies the areas least likely to be submerged in salt water, although sometimes forming groups in soils permanently waterlogged, but less salty (Rzedowski, 1978).

Along the Atlantic coastline in Tamaulipas mangrove forests may be dominated by Red Mangrove or Black Mangrove and generally grow to a height of 3 or 4 m, although in some places heights may reach 6 m (Rodríguez-Zúñiga et al., 2013; Rodríguez-Zúñiga and Troche-Souza, 2015).

Rodríguez-Zúñiga et al. (2013: Chapter 4) provide a table showing the extent of mangrove forests in the states of Mexico as of 2010: Baja California (36 ha), Michoacán (1,419 ha), Tamaulipas (3,095 ha), Jalisco (2,201 ha), Colima (3,237 ha), Sonora (11,334 ha), Guerrero (8,123 ha), Oaxaca (18,607 ha), Baja California Sur (26,694 ha), Veracruz (37,841 ha), Tabasco (44,590 ha). The six states with the largest areas of mangrove

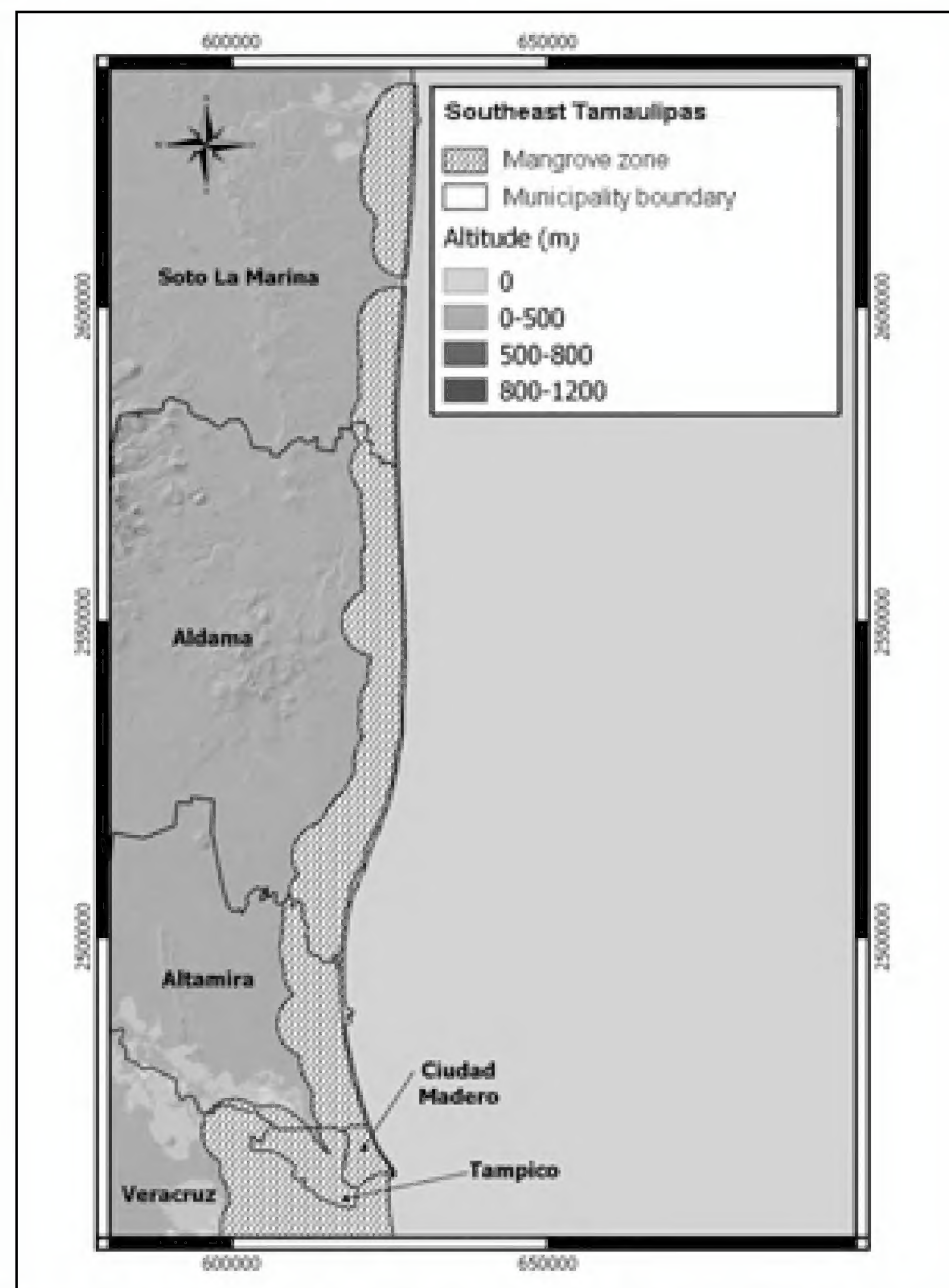


Figure 2. Southeastern Tamaulipas, showing the municipalities of Aldama and Soto La Marina.

forests are: Chiapas (46,276 ha) Nayarit (66,920 ha), Sinaloa (77,088 ha), Yucatan (91,356 ha), Quintana Roo (128,049 ha) and Campeche (197,620 ha).

Sri Lanka was the first nation to protect its many mangroves. Such protection is difficult to achieve with so many interests in developing these areas for agriculture or tourism. Many nations should take the example of this country. (<http://www.bbc.com/news/science-environment-32683798>)

Study Area

Aldama and Soto la Marina are two of the 43 municipalities (equivalent to U.S. counties) that make up the geographical-political divisions of the state of Tamaulipas. Aldama is located in southeastern Tamaulipas, encompasses approximately 1,361 km², and is bordered on the north by Soto la Marina. Soto la Marina encompasses approximately 6,422 km². The coast of Aldama has some very limited fisheries, and tourism is a significant part of the economy there, where the beaches attract visitors. The principal tourist beaches in Aldama are Barra del Tordo, Moron and Rancho Nuevo. This last beach is the primary nesting beach of *Lepidochelys kempii* (Kemp's Ridley Sea Turtle / *Lora*), and major conservation efforts are centered there. On the other hand, in Soto la Marina, where the Laguna Madre is located, fisheries are the principal economic activity. No large cities are located on its shores; only small fishing villages like La Pesca situated on the bank of Río Soto la Marina. The aquatic ecosystem of Laguna Madre is dominated by sea grass; mangrove forests make up the shoreline. Both anthropogenic

influences and natural climatic events, such as droughts and hurricanes affect these ecosystems (Tunnell and Judd, 2002). The total shoreline of Aldama and Soto la Marina is approximately 231 km (INEGI, 2010b). Rodríguez-Zúñiga et al. (2013) list the following shoreline localities: Barra Ostiones (Soto La Marina), Barra del Tordo (Aldama), Delta del Rio Bravo (Reynosa), La Pesca (Soto La Marina), Laguna de Morales (Soto La Marina), Lomas del Real Miramar (Altamira), Rancho Nuevo (Aldama) and Pueblo Viego-El Chairel (at the Tamaulipas-Veracruz border).

Aldama Climate

The northern border of Aldama lies approximately 15 km south of the Tropic of Cancer. The climate is hot, with temperatures commonly exceeding 35°C (95°F) from May through October. The winters are mild, and freezing temperatures infrequent. Precipitation increases in the months of June through October, marking the wet from the dry season, but winter and spring rains are not unknown. In the east, the humidity is higher and coastal areas may receive higher rainfall due to proximity to the Gulf of Mexico. (García, 1981; 2004). Tropical depressions and hurricanes contribute significantly to the annual rainfall on the Gulf of Mexico. This helps to give the coastal plain of southern Tamaulipas its tropical appearance, standing in contrast to areas west of the Sierra Madre Oriental, which create a rain shadow effect on the deserts of Mexican Plateau. The climate for the area can be consulted at INEGI (2010a). These characteristics are very similar for Soto La Marina.

Aldama Vegetation

Predominant vegetation types throughout much of Aldama are tropical thorn forest and tropical thorn scrub, dominated by acacias, mesquites, and cactuses. Extensive clearing of vegetation by ranchers for cattle grazing makes it difficult to determine to what extent other vegetation zones occurred in the region. Riparian areas still support tropical deciduous forest and lush gallery forest and the tropical deciduous forest might have been much more extensive in recent decades before cattle ranching expanded. Jean Louis Berlandier, who passed through the area in 1831, described the area between the towns of Altamira and Aldama as having some extensive forests, dominated by *Quercus oleoides* (Black Oak / *Encino Negro*), and broken by small prairies, and also large prairies being burned for pasture (Berlandier, 1980). Goldman (1951) described visits to adjacent areas

of the municipality of Altamira to the south in 1898. About 10 miles north of Altamira open grassy plains begin and stretch away to the north indefinitely. Goldman (1951) also described forest here and there on these plains in strips that may be several miles wide with oak trees and *Brosimum alicastrum* (*Ojite*) as significant components. Remnants of these vegetation types can still be found in the southern areas of the municipality, among the cropland and ranches. Dry oak forest still occurs in the Sierra de los Martinez northeast of the town of Aldama although much of this has been cleared for grazing as well. Scattered palm trees may occur at lower elevations and occasionally these form groves that might be described as palm forest, but to what extent these occurred in the past is unclear. Martin et al. (1954) provided an account of the Sierra de Tamaulipas including descriptions of the vegetation zones and the herpetofauna, describing tropical deciduous forest occurring at 300–700 m, limited areas of montane scrub at 600–900 m, and pine-oak forest above 800 m. Although Martin's study area was centered around the town of Acuña and areas in the adjacent municipalities of Casas, Gonzalez and Llera de Canales, his descriptions are applicable to the portions of the Sierra de Tamaulipas in Aldama as well. Another interesting plant community, although limited in range, are the mangrove swamps. Small patches can be found on the coast, and being important habitat for migratory birds and a significant element when it comes to suppressing the actions of hurricanes on the coastline, should be considered important areas for conservation (CONABIO, 2008; Luther and Greenberg 2009).

Soto La Marina Climate

According to INEGI (2010b) the climate that prevails in the municipality of Soto La Marina is semiwarm, subhumid, according to the classification of García (1981, 2004), characterized by average temperatures that range from 20°C to 26°C in the months of May to August. Annual precipitation ranges from 700 to 1100 mm. Summer is the rainy season, with high humidity and increased water levels. To the south of the municipality moisture is lower so the typical climate is semi-dry, very warm, and temperatures tend to be higher than in the north. There are less intense seasonal rains in summer, with average rainfall of 800 mm, so the temperature remains stable around 34°C during the months of May to September.

Soto La Marina Vegetation

Soto La Marina plant communities vary depending on water



Shoreline red mangrove forest in the municipality of Aldama, Tamaulipas, Mexico. This habitat may be used by the local herpetofauna as a foraging area. Photograph by David Lazcano.



A small patch of Red Mangrove in the municipality of Soto La Marina, Tamaulipas, Mexico. The herpetofauna of the surrounding area is documented here. Photograph by Alejandro Treviño-Gonzalez.



Protecting the nests of *Lepidochelys kempii* at Rancho Nuevo, Aldama, Tamaulipas, very near the shoreline Red Mangrove forest. Photograph by Alan Kardon.

availability or proximity to water bodies. Towards the interior the mangrove forest gives way to lowland forest, with communities of trees that measure between 5 and 8 m, dominated by ebony trees (Valiente-Banuet et al., 1995). The following species may be found in the lowland forest: *Acacia farnesiana* (Sweet Acacia / Huizache), *Ceiba pentandra* (Kapok / Ceiba), *Cordia boissieri* (Anacahuita / Anacahuita), *Ebenopsis ebano* (Texas Ebony / Ébano), *Eheretia anacua* (Anacua / Anacua), *Enterolobium cyclocarpum* (Monkey Soap / Huanacastle), *Erythrina herbacea* (Red Cardinal / Colorin), *Esenbeckia runyonii* (Berlandier's Jopoy / Limoncillo), *Gliricidia sepium* (Quickstick / Cacahuanano), *Sapindus saponaria* (Wingleaf Soapberry / Jaboncillo), *Myrcianthes fragrans* (Twinberry / Guayabillo), *Maclura tinctoria* (Fustic / Mora), *Leucaena leucocephala* (White Leadtree / Guaje), *Spondias mombin* (Yellow Mombin / Jobo), *Prosopis juliflora* (Mesquite / Huizache), *Tabebuia rosea* (Pink Trumpet-tree / Primavera), *Tecoma stans* (Yellow Trumpetbush / Tronadora).

Tamaulipan Thorn Scrub, a shrubby plant community, is found in the more arid inland regions. According to Villarreal (2000) we can observe the following elements: *Acanthocereus tetragonus* (Triangle Cactus / Cruceta), *Callicarpa acuminata* (Black Mexican Beauty Berry / Granadilla), *Castela tortuosa* (Texan Goatbush / Chaparro Amargoso), *Celtis pallida* (Desert Hackberry / Granjeno), *Citharexylum berlandieri* (Berlandier's Fiddlewood / Laurel Cimarron), *Ebenopsis ebano* (Texas Ebony / Ébano), *Erythrina herbacea* (Red Cardinal / Colorin), *Eysenhardtia texana* (Texas Kidneywood / Bara Dulce), *Havardia pallens* (Tenaza / Tenaza), *Karwinskia humboldtiana* (Coyotillo / Coyotillo), *Leucophyllum frutescens* (Texas Barometer / Cenizo), *Lycium carolinianum* (Christmas Berry / Saladilla), *Parkinsonia aculeata* (Jerusalem Thorn / Retama), *Podopterus mexicanus* (Rompe Capa), *Prosopis juliflora* (Mesquite / Mezquite), *Schoepfia schreberi* (Gulf Graytwig / Coloradillo), *Sideroxylon celastrinum* (Saffron Plum / Coma), *Yucca filifera* (Yucca / Palma Pita), *Yucca treculeana* (Spanish Dagger / Chocha).

Results

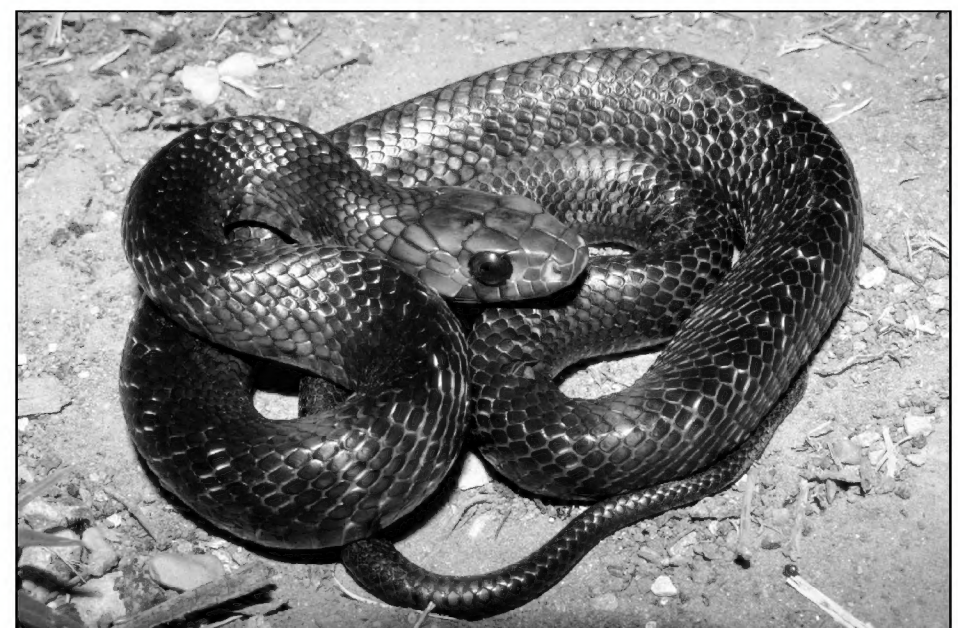
We conducted five collecting trips to the area during 1997–1998, and an additional five collecting trips during 2006–2009. With the information obtained from these trips we constructed a

list of herpetofauna found in or near the mangrove forests in the municipalities of Aldama and Soto La Marina, Tamaulipas, Mexico (Table 1). Near the mangrove forests we observed eight species of amphibians, representing seven genera, five families and one order. In and around the mangrove forests we observed 24 species of reptiles, representing 24 genera, 12 families and three orders. Only two species were observed within the mangrove forest: *Holbrookia propinqua propinqua* and *Drymarchon melanurus erebennus*.

Discussion and Conclusion

Much has been written about the mangrove forests of the world, covering such specific subjects as adaptations, root aeration, salt balance, reproduction, seed dispersal, productivity and nutritional flux, ecological roles, and restoration. Here we mention a few articles that are related to the association of mangrove forests and herpetofauna. Odum et al. (1982) wrote an extensive essay on mangroves in south Florida, mentioning the presence of 24 species of amphibians and reptiles, and their use as foraging and nesting areas, especially for marine turtles and crocodilians. Another document covering south Florida (U.S Fish and Wildlife Service, 2014), mentions the mangrove community as a vital component of the estuarine and marine environment, providing a major detrital base to organic food chains, significant habitat for arboreal, intertidal and subtidal organisms, nesting sites, cover and foraging grounds for birds, and habitat for some reptiles and mammals. The relationship between mangroves and their associated marine life cannot be overemphasized. The mangrove forest provides protected nursery areas for fishes, crustaceans, and shellfish that are important to both commercial and sport fisheries.

The value and central role of mangroves in the ecology has been well established by numerous scientific investigations directed at primary productivity, food web interactions, listed species, and support of sport and commercial fisheries. Mangroves are important in recycling nutrients and the nutrient mass balance of the estuarine ecosystem. The primary mangrove ecosystem and associated secondary ecosystems are among the most biologically productive in the world. Mangroves provide one of the basic food chain resources for arboreal life and nearshore marine life through their leaves, wood, roots, and detrital materi-



A snake species found active in the red mangrove forest, the Texas Indigo Snake, *Drymarchon melanurus erebennus*. Photograph by Michael S. Price.

Table 1. Species found in the municipalities of Aldama and Soto La Marina, Tamaulipas, Mexico. ● = species recorded in and around the mangrove forest by this study.

Order	Family	Species
Caudata	Plethodontidae	<i>Pseudoeurycea cephalica</i>
Anura	Bufonidae	<i>Incilius nebulifer</i> ●
		<i>Rhinella marina</i> ●
	Eleutherodactylidae	<i>Syrrhophus c. cystignathoides</i>
		<i>Syrrhophus guttilatus</i>
	Hylidae	<i>Ecnomiohyla miotympanum</i> ●
		<i>Scinax staufferi</i>
		<i>Smilisca baudinii</i>
		<i>Trachycephalus typhonius</i> ●
	Leptodactylidae	<i>Leptodactylus fragilis</i>
		<i>Leptodactylus melanonotus</i>
	Microhylidae	<i>Gastrophryne elegans</i> ●
		<i>Hypopachus variolosus</i>
	Ranidae	<i>Lithobates berlandieri</i> ●
		<i>Lithobates catesbeianus</i> ●
	Scaphiopodidae	<i>Scaphiopus couchii</i> ●
Squamata–Lizards	Anguidae	<i>Ophisaurus incomptus</i> ●
	Corytophanidae	<i>Laemactus serratus</i>
	Gekkonidae	<i>Hemidactylus frenatus</i>
	Iguanidae	<i>Ctenosaura acanthura</i> ●
	Dactyloidae	<i>Anolis sericus</i>
	Phrynosomatidae	<i>Holbrookia p. propinqua</i> ●
		<i>Sceloporus grammicus disparilis</i> ●
		<i>Sceloporus olivaceus</i>
		<i>Sceloporus cyanogenys</i>
		<i>Sceloporus variabilis</i>
	Scincidae	<i>Plestiodon brevirostris</i> ●
		<i>Plestiodon tetragammus</i>
	Teiidae	<i>Ameiva undulata</i>
		<i>Aspidoscelis scalaris gularis</i> ●
	Xantusiidae	<i>Lepidophyma sylvaticum</i>
Squamata–Snakes	Boidae	<i>Boa constrictor imperator</i> ●
	Colubridae	<i>Coluber constrictor oaxaca</i> ●
		<i>Coluber flagellum testaceus</i>
		<i>Coluber m. mentovarius</i>
		<i>Coniophanes i. imperialis</i>
		<i>Drymarchon melanurus erebennus</i> ●
		<i>Drymobius m. margaritiferus</i>
		<i>Ficimia streckeri</i> ●
		<i>Imantodes cenchoa leucomelas</i> ●
		<i>Lampropeltis annulata</i>
		<i>Leptodeira annulata cussiliris</i> ●
		<i>Leptodeira s. septentrionalis</i>
		<i>Leptophis mexicanus</i> ●
		<i>Nerodia rhombifer blanchardi</i>
		<i>Opheodrys aestivus</i>
		<i>Oxybelis aeneus</i>
		<i>Pantherophis emoryi</i> ●
		<i>Pituophis catenifer sayi</i>
		<i>Pseudelaphe flavirufa flavirufa</i> ●
		<i>Senticolis triaspis intermedia</i>
		<i>Spilotes pullatus mexicanus</i> ●
		<i>Storeria dekayi texana</i>
		<i>Thamnophis m. marcianus</i> ●
		<i>Thamnophis proximus diabolicus</i>

Table 1. (cont'd)

Order	Family	Species
Squamata–Snakes	Colubridae	<i>Tropidodipsas fasciata</i>
		<i>Tropidodipsas s. sartorii</i>
	Elapidae	<i>Micrurus tamaulipensis</i>
		<i>Micrurus tener</i> ●
	Viperidae	<i>Agkistrodon taylori</i> ●
		<i>Crotalus totonacus</i>
Crocodylia	Crocodylidae	<i>Crocodylus moreletii</i>
Testudines	Cheloniidae	<i>Caretta caretta</i>
		<i>Chelonia mydas</i>
		<i>Eretmochelys i. imbricata</i>
		<i>Lepidochelys kempii</i> ●
	Dermochelyidae	<i>Dermochelys coriacea</i>
	Emydidae	<i>Terrapene carolina mexicana</i> ●
		<i>Trachemys venusta cataspila</i> ●
		<i>Trachemys scripta elegans</i>
	Kinosternidae	<i>Kinosternon herrerae</i> ●

als. This primary production forms a significant part of the base of the arboreal, estuarine, and marine food web. Mangroves have a significant ecological role as physical habitat and nursery grounds for a wide variety of marine / estuarine vertebrates and invertebrates.

For the purpose of comparison the closest area we could use is the mangrove forest in the area of Pueblo Viego-El Chairel, on the border between the states of Tamaulipas and Veracruz. CONABIO (2008) lists the species of amphibians and reptiles for this area. That study reported 7 species of amphibians and 14 species of reptiles; we report 8 species of amphibians and 24 species of reptiles. Four amphibians were found in both studies: *Lithobates berlandieri* (Rio Grande Leopard Frog / *Rana Leopardo*), *Incilius nebulifer* (Gulf Coast Toad / *Sapo Comun*), *Rhinella marina* (Cane Toad / *Sapo Marino*), and *Scaphiopus couchii* (Couch's Spadefoot / *Sapo de Couch*). Six species of reptiles were found in common by the two studies: *Ficimia streckeri* (Tamaulipan Hook-nosed Snake / *Serpiente Narice de Gancho Tamaulipeca*), *Leptophis mexicana* (Mexican Parrot Snake / *Ranera Mexicana*), *Pseudelaphe flavirufa* (Tropical Ratsnake / *Ratonera del Tropico*), *Thamnophis marcianus* (Checkered Gartersnake / *Culebra Acuática*), *Thamnophis proximus* (Western Ribbonsnake / *Culebra Acuática Occiden-*



Texas Coralsnake, *Micrurus tener*, found near the red mangrove forest in Aldama, Tamaulipas. Photograph by Alan Kardon.

tal), and *Kinosternon herrerae* (Herrera's Mud Turtle / *Tortuga del Fango de Herrera*).

Another reference for comparison (Lazcano et al., 2009) reports a total of 71 species of herpetofauna found DOR, AOR, or in the field in the municipality of Aldama, Tamaulipas. Of these 32 are common to Table 1. We understand that the amount of species could increase with more intense field work within the mangrove forests, but they are very dense and difficult to penetrate.

Many years of surveying the herpetofauna of Tamaulipas have resulted in range extensions for species within the state (Farr et al., 2007, 2009, 2013). Some species were found near mangrove forests, for example *Spilotes pullatus mexicanus* (Tropical Tree Snake / *Serpiente Tigre Arbórea*) in the municipality of Aldama and a DOR specimen of *Iguana iguana* (Green Iguana / *Iguana Verde*) in a transition area between a beach and



The milky treefrog, *Trachycephalus typhonius*, lives near freshwater ponds, but can be found close to the mangrove forest. During the rainy season, when a breeding chorus is vocalizing, you can't hear yourself talk. Photograph by Alan Kardon.



Another snake species found around the red mangrove forest, *Crotalus tototus*. Photograph by Javier Banda-Leal.

remnants of a mangrove forest in the municipality of Altamira, a municipality south of Aldama.

We also used for comparison Contreras-Lozano et al. (2013). They recorded 17 species: one anuran, one crocodile, six turtles, three lizards and six snakes. Of these, 10 species are at risk, six are of special concern, three are threatened, and one endangered. Although this research in Sota La Marina was conducted mostly inland, there are species in common with our list such as:

Lithobates berlandieri, *Aspidoscelis scalaris gularis*, *Drymarchon melanurus erebennus*, *Pantherophis emoryi*, *Thamnophis proximus diabolicus*, *Lepidochelys kempii* and *Terrapene carolina mexicana*.

On a recent field trip (August 2015) we visited a private ranch in Soto La Marina. We observed *Leptophis mexicanus*, *Oxybelis aeneus* and *Ameiva undulatus*. Also, when visiting Rancho Nuevo in Aldama, we were told by one of the biologists there (pers. com., Jose Manuel Colmenares, 2015) that he had recently observed two *Leptophis mexicanus* and one *Boa constrictor imperator* active within the red mangrove forest, next to the sea turtle nesting beach. And in the bathroom there were a few *Smilisca baudinii*.

Mexican mangrove experts, working with advanced satellite data, are able to map the extent of these ecosystems, and have made great efforts to educate our citizens about their vital importance (Rodriguez-Zúñiga et al., 2013; Rodriguez-Zúñiga and Troche-Souza, 2015).

We agonize over the lack of interest from the general public. The director of CONABIO and his team have made an extraordinary effort to assist researchers in every field by supporting research projects (Sarukhán et al., 2015). They have been publishing books and articles to inform the scientific community, politicians, and the general public of the importance of what they call “Natural Capital of Megadiversity” of the country, the suitable uses of our resources and conservation focus for present and future generations.

For a list of the endangered species associated with mangroves, the reader is urged to consult Carson (2013).

Despite all efforts, there are enormous challenges ahead for all of us in Mexico: mangrove experts, the federal, state, municipality government authorities; SEMARNAT-PROFEPA; NGOs; resource managers; the private sector; tourists; and the general public. The scientific community in particular must find solutions to the threats posed by climate change, and the resulting elevation of sea levels (Ellison, 1993; Field, 1995; Corn, 2005; Alongi, 2008; Gilman et al., 2008).

Adverse effects on mangrove forests are likely to continue, and worsen, as human populations expand all over the world. In regions where the mangroves have been removed there has been significant worsening of the problems produced by hurricanes/cyclones/tsunamis. Efforts are underway to launch mangrove agroforestry and agriculture projects. Mangrove systems require intensive care to save threatened areas. So far, conservation and management efforts lag behind the destruction; there is still much to learn about proper management and sustainable harvesting of mangrove forests.

Even knowing what’s happening to these priceless forests, most people just look the other way (Upadhyay et al., 2002). Then when we want to encourage restoration it costs millions of dollars more, money many nations can’t afford in view of the current economic crisis in the world.

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First Report of the Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*) in Columbia County, Pennsylvania

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On 6 June 2015, we discovered *Cryptobranchus alleganiensis alleganiensis* while conducting surveys within a tributary of the North Branch Susquehanna River in Columbia County, Pennsylvania (tributary name and exact locality data are withheld due to conservation concerns). Two individuals (total lengths: 33.6 cm and 45.7 cm) were captured by hand during snorkeling surveys, measured, pit-tagged, and released. Voucher photographs were verified by Kenneth L. Krysko and deposited in the herpetology collection at the Florida Museum of Natural History (UF 176878). This finding represents a new county record for *C. a. alleganiensis* in Pennsylvania (McCoy, 1982; Hulse et al., 2001;

Pennsylvania Amphibian and Reptile Survey: www.paherpsurvey.org, accessed 27 Jan 2016; www.vertnet.org, accessed 27 Jan 2016). *C. a. alleganiensis* have previously been documented from several localities within adjacent Lycoming County (Hulse et al., 2001) and were historically reported in the literature from a single locality in adjacent Luzerne County (McCoy, 1982).

Hellbender surveys were permitted by the Pennsylvania Fish and Boat Commission (permit # 2015-01-0154, Type 1) and approved by the Bloomsburg University Institutional Animal Care and Use Committee (approval # 101).

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Fifty

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Word has recently reached the ears of this author that 2016 is the 50th anniversary of the formation of the Chicago Herpetological Society (CHS). My first reaction to this news was one of disbelief. Great feats of thinking next ensued. My mind became a raging torrent of faulty memories, which, after some prompting from our beloved editor, were finally set aright. It all makes sense to me now. The CHS is indeed 50 years old. I'm thinking that a parade honoring this major event in American history is in order. I've already shot a letter to the Mayor of Chicago, suggesting dates that Lake Shore Drive could be shut down for our upcoming procession. I'm expecting an answer soon. I'm hoping that our esteemed artist Don Wheeler will help us build a giant Spot float that we can all ride on. I'll bet that dozens of people would line the streets of Chicago to witness the occasion. If we wish to draw a larger crowd, we might plan the event for October—when our 2016 Chicago Cubs will finally win the World Series. (Yup, this year will be the next year we've spent our lifetimes talking about). Surely the cubbies will want us to be part of the festivities—they'll probably put us on our giant Spot float up front. Even as these words are written, I'm really getting stoked about the notion.

All jesting aside, 50 years is an impressive streak for a herp society. I'm sure that the memory of your first CHS meeting is as crystal clear as the night of the moonwalk and the day of the JFK assassination. (Hmmm—maybe a parade isn't such a hot idea after all?). What were you doing the day of your first CHS meeting? Well, *you* might not remember—but I do!

I first got wind of the CHS through a good friend of mine, Dale Rover. I met Dale in my 7th grade English class, which was taught by a woman named Miss Slaven. (Note the deliberate use of the word “Miss” here. This is 1966 we're talking about, when the now universally accepted “Ms” had not yet been adopted). In the early going of the school year, Miss Slaven directed us to write what she called a “snapshot” of our classmates. We were supposed to write about somebody we didn't know, but would like to know better. I don't even remember who I wrote about. But I *do* remember who Dale wrote about. Me! Dale was seeking somebody who shared his love of all things reptilian. I didn't know Dale at the time. But Miss Slaven read all of our snapshots before the class. When she read Dale's snapshot, I knew that I had a good friend in the making, and there was no way I was going to let that slide.

With my first visit to his house, a month or so later, Dale showed me a hefty write-up in the *Chicago Sun Times* about this newly-formed group that was calling itself “The Chicago Herpetological Society.” This article was written by some unknown journalist named Roger Ebert. (There can be little doubt that this article was the gem that jetted him to fame). To show how far I've come in the last 50 years, (or how low I have sunk), prior to seeing this article, I knew not the meaning of the word “Herpetological.” It was the first time that I had ever seen the word! Among many other details contained in this article was

some information about where and when the meetings were held. Dale's mother, Ruth Rover, (perhaps another indication of how long ago 50 years was—nearly every family unit shared a last name), had agreed to take us to this meeting. Did I want to go? Oh boy, and you bet! I of course had to get permission from my mother to go first. But the fact that Dale's mother was escorting us weighed heavily in my favor. That, along with the fact that my mother was always happy to be rid of me for a day, assured the deal. However, poor ma had a lot of trouble with the word “herpetological.”

“So, tell me again about this hermit-ta-watchamacallit society.”

“The word is herpetological, ma . . .”

“Herppetunctual?”

“No—jeez ma! Herpetological. People who study reptiles are called herpetologists.”

“Herpeta-what?”

“Herpetologists.”

“And they study reptiles?”

“Yes, ma.”

“Well, these here Herpetopotomous folk sound like a pretty strange lot to me. What's there to study about with reptiles? You've seen one, you've seen them all. Why do they have such a big name for it? Why don't they just call themselves weirdos? Seems to me that's what they are! You'll probably fit right in, though. I wonder if they switched babies on me at the hospital? There's none of these here Herpetopotomouses in our family history.”

“Herpetopotomouses? Goodness gracious, ma! Maybe they *did* switch babies at the hospital. Is it okay if I go try to find my real mother? I think I need to talk to *her* about all this.”

“Don't get smart with me, young man, or I'll knock you into the middle of next week. Do you want to go to this meeting, or do you just want to stand there and sass me?”

Actually, I *did* just want to stand there and sass her. But being a kid sometimes requires the utmost in diplomacy. If I wanted to go to this herpetopotomous meeting, and hang with the herpetopotomouses, the sucking up process needed to start immediately. That was going smoothly, until we got to the part where I needed her to write me a note to get out of school that day. The Rover's wanted this trip to be an all day sucker, and the meeting nights were, as has been customary for fifty years, on the last Wednesday of every month. (That is quite a streak, by the way).

Poor ma was having such trouble with the word herpetological that I offered to write the note for her. Truth be told, I had written many such notes for her in the years past—she just didn't know about them. Fortunately for me, I had not yet

ditched school this year, and my teachers were unaware of the differences in our penmanship. We finally settled the issue by agreeing that the content of the note would center on the cultural attractions of Chicago, and leave the herpetopottomouses part of it out. My teachers bought ma's note hook, line and sinker—as they were also happy to be rid of me. I expect that if the sturdy wall junctures in the classrooms of Central School in Crystal Lake had any feelings at all—then *they* might have missed me. I spent most of my school days standing with my nose pressed against them.

The morning of January 25, 1967, finally arrived. At the crack of dawn, Ruth, Dale and I boarded the Chicago and Northwestern train and headed toward the Big Windy. By riding the train, we avoided the murderous traffic jams that at times turn Chicago's freeways into a linear parking lot. As the clever radio campaigns for the C&NW advertised, when riding the train, there was none of this “Turn signal left, turn signal right, brake, accelerator, brake, accelerator, turn signal left, turn signal right, brake, accelerator, brake, accelerator—pound your fist against the dashboard . . . Go Northwestern, go Northwestern—it's the very best way to go.” As advertised, it *was* the very best way to go, and this visit to Chicago set up what would soon be our monthly routine.

I had visited Chicago before at various times with my family. But with them, the visits were a rocket run. Jet to the Field Museum, spend two hours, head home. Jet to the Museum of Science and Industry, spend two hours, and leave. But mostly, it was Cubs games. For as long as I could remember, and even before that, we went to see the Cubs at least four times a year—sometimes more. But, again, these visits were jet to the game, leave as soon as it was over. But when Dale, Ruth and I went on this fateful day, we didn't just visit Chicago—we *did* Chicago! It was indeed an all-day sucker. We rode the buses, and I quickly learned that the fine city of Chicago went well out of their way to entertain guests by placing a nutcase on every bus. But we walked to most of the places we went. I was amazed by the giant, ship-catching chains in front of the Chicago Historical Museum, and went deep with the story of the great Chicago Fire. We rode to the top of the Prudential Tower, and marveled at the ant-sized people working their way through the towering skyscraper canyons below us. We swept through the Lincoln Park Zoo, and outlasted everybody in the Reptile House. At length, we drifted over to the Chicago Academy of Sciences building. I found a display case there that contained replicas of all the herps native to the region, and spent at least an hour in front of that case, my eyes consuming all within with a herpetological lust that no mere mortal could begin to understand. And it was here that I met Roger Conant. Not Roger Conant the person—that would not happen until later. No, we speak of Roger Conant's *awesome* book, *A Field Guide to Reptiles and Amphibians of Eastern North America*. Just leafing through that book for the first time took me light years beyond everything I had ever seen or learned through the “Golden Guide” era of my life. Yeah, this was shaping up to be a mighty fine day for sure! We left the Academy for a bite of supper, and then once again walked up the cement steps and headed for the door, which was flanked with impressive pillars that seemed to my young and impressionable mind to reach upward to the moon and beyond.

We stepped through that door, entered the foyer, and *nothing* could have possibly prepared me for what came next.

As indicated, the date was 25 January 1967. Hence, while the CHS is celebrating its 50th anniversary, this author is one year shy of that milestone. I'm only aware of a few active members with more seniority than me. One would be Mike Dloogatch, who attended the October 1966 meeting for his first time, and subsequently joined. Ray Pawley was also at the first meeting that I attended. I have also recently learned that Hedda Saltz came in with the first load of bricks, and Dick Buchholz has been around awhile. If there are others reading this article with more seniority than this grouping, we'd *love* to hear from you. This all is only said because going forward, I will use the term “50 years” liberally—even though for me it is only 49 years and some change. Speaking of change, there has been a lot of that over the past 50 years. Man had not yet set foot on the moon. There were no microwave ovens, personal computers, hand-held calculators or cell phones. The internet was still 25 years away from any widespread usage, as were websites. The changes that occurred across this time span are exponentially greater than any other similar time period that has preceded it in the history of mankind.

The same can be said about herpetology. While there have always been herpetologists among us, they were few and far between. The CHS was an early riser compared to the explosive wave of herpetoculturists that followed over two decades later. Rules and regulations regarding collecting, bartering and selling amphibians and reptiles were nearly nonexistent. Our perceptions of what was or wasn't acceptable behavior have changed as radically as comparing the world's first telegraph to today's iPhones. Fifty years ago, herpetology in general, and the CHS specifically, could be compared to the Wild West. Some of what follows in this and future articles may be shocking to you. While I sure can't say that it wasn't one hell of a good time, I can also say with assurance that both herpetology and the CHS have evolved into better things. It was a learning process for all of us, and we must not lose sight of the fact that this is being reported from the perspective of a wide-eyed 12-year-old boy.

Two paragraphs ago, we left three people entering the hallowed halls of the Chicago Academy of Sciences, about to witness their very first CHS meeting. Upon ingress, we saw people gathered in clusters around whoever happened to have a herp in hand. The multitude and magnitude of some of what was being passed around would make Mother Nature herself jealous. In an instant, I was in the thick of it all, drifting from herp to herp, and coveting everything I saw. To be sure, I had seen some of the stuff before, but that was usually behind glass at either a zoo or a pet store. But with most of what I saw, I was seeing it for the very first time. There were many types of boas, pythons, ratsnakes, and tricolors. One woman had an Eastern Kingsnake that must have been six feet long and was at least 2.5 inches in diameter. A massive Eastern Indigo Snake was also on display, the kindly woman who owned it let me handle it and oh boy, was that ever cool! There was a large and pissy Northern Pinesnake in the midst as well. The lizards were also well represented. There were impressive iguanas and monitors, chameleons of several kinds, tegus, and smatterings of others that I

can't remember. The turtles and tortoises were also everywhere apparent. There was a mata mata in the crowd, which was a first for me. There were redfoot and yellowfoot tortoises, pancake tortoises, Greek tortoises, Texas tortoises, and again, many more than I can remember.

Eventually, a five minute warning that the meeting was about to begin was issued. Everything was bagged and placed in coolers, and the crowd trickled into the auditorium. There were roughly 50 people in attendance. The meeting was called to order by the president and founding father of the CHS, Bob Marek. There were many announcements, the content of which eludes me. This is just as well, as they would mean less than nothing today. Eventually, Bob introduced the speaker for that evening, who was Esther Lewis. Esther rocked our world with a recorded slide show about the finer nuances of amphibians and reptiles, and did a follow up presentation by showing off her four-foot-long alligator. She had been keeping this alligator for over eight years at the time. It had been grandfathered into her collection just before alligators were listed under the auspices of the Endangered Species Act. Hence, it was a rare animal for a private individual to be able to display. It laid in her arms much a like a large house cat would, and just gave us all a big, toothy alligator grin while Esther lovingly stroked its head and body. I wanted one!

Following the question and answer session, we all drifted back out to the lobby. Everybody unpacked their herps again, and the herpetological free-for-all continued right where it left off. I managed to pry myself away from the festivities for long enough to track down the treasurer, and formally join the society. I was handed a wallet sized card that indicated I was a member in good standing. On this card was embossed a rusty colored image of a Red-tailed Boa sprawled out in a lazy C-shaped coil. It was bad to the bone, and I felt like I was king of the world by having one of these cards. I was sure to be the envy of Crystal Lake by flashing this card around. I would become a babe magnet with this card, and the world would be my oyster. All too soon, this fabulous evening came to an end. But the groundwork of a new era in my life had been laid. In much the same fashion that Conant's field guide lifted me above the Golden Guide limitations, so the CHS lifted me to new levels in the herpetological scene. I even scrawled out an article for the CHS *Bulletin*, which appeared in the Summer 1967 issue. It was to be the first of many publications for me, and humble though it

was, "A Salamander Hunt" was definitely a glimmer of things to come. The CHS made all things that followed in my lifetime possible, and I owe the founding fathers a debt of gratitude for helping me to become what I am today. Exactly what that is, I'm not sure, but I wouldn't trade places with anybody in the world! And for what it's worth, these monthly rants of mine in the hallowed pages of the CHS *Bulletin* have made life worth living again for me.

My initial approach to this article was inspired by the fact that 2016 is the fifty-year anniversary of the CHS. But it wasn't going to be an article about the turning point in my life that the CHS created. Hell no — far from it! I went into this with the notion that I was going to cut loose with some outrageous situations that the herpetological flea market atmosphere of the early days of the CHS helped to generate. Now that we have my first meeting behind us, I will turn loose with that sort of thing in a future article. I'm already laughing just thinking about it!

About halfway through this article, it became clear to me that if I didn't bring up some historical fact about the roots of the CHS, perhaps nobody else would. That would be tragic, because to date, there is nothing nailed in print that describes the origin of the CHS. If we don't document our history soon, it will likely never happen. Dudes and Dudesses, 50 years is an awesome achievement! The CHS is a whale amongst minnows, a trout amongst carp, and a python amongst worms when compared to other regional herp societies. We do owe tribute to those who made it all possible.

Our beloved editor has already produced some eye-popping documents that are certainly pieces of the puzzle. But our mutual memories are colliding on some clutch pieces of information that, in my estimation, we are missing. The fact that Mr. Dloogatch has as much as he has is amazing, and I am in awe of that which he has acquired and saved through the years. But there's more—I *know* there's more, and I aim to go get it. Hence, I will close this article by stating that I am on a mission to find out the last missing tidbits of information that might still be out there. I'm on it like stink on a monkey. In the meantime, happy 50th anniversary to the Chicago Herpetological Society! May the next 50 years be as good as the first.

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Herpetology 2016

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

RATTLESNAKE MIGRATION PATTERNS

L. Gomez et al. [2015, Journal of Herpetology 49(3):371-376] note that contrasting movements and habitat use may occur among snakes, and these differences may reflect important local responses to habitat variation and/or signify that broad, uni-modal approaches to species conservation are too coarse. Fine-scale differences in these behaviors (e.g., between neighboring conspecifics) may be underappreciated because studies either focus exclusively on one (sub)population, and/or the animals are not compared across relevant ecological boundaries. The authors report on a striking dichotomy of seasonal migration behavior between rattlesnakes (*Crotalus oreganus*) using two neighboring den sites. The snakes at one site undertook long-distance (2.9 ± 0.57 km [mean $\pm$ SD]), highly directional migratory behavior that was consistent across years and individuals. These movements carried them out of the habitat normally associated with these animals in this region (grassland steppe) and into higher elevation forests, a habitat not previously reported for these animals. Conversely, snakes at another den only 21 km away were nonmigratory (0.97 ± 0.54 km) and remained in grassland habitat throughout the year. Landscape and other environmental factors may have been responsible for the difference in the behavior of these two denning groups, suggesting that our knowledge of what dictates the migratory behavior of animals such as snakes is far from complete. Stereotyping the habitat use and behavior of any snake population is potentially misleading, and more thorough exploration is needed on how these animals alter their local movement patterns in response to changes in landscapes and habitat configurations, including potential climate change effects.

REDISCOVERED AND CRITICALLY ENDANGERED

O. Zinenko et al. [2016, Herpetozoa 28(3/4):141-148] report that the occurrence of *Vipera anatolica* Eiselt & Baran, 1970, in the territory of the type locality (cedar forest reserve "Çiğhkara Ormanı" in the western Taurus Mountains of southern Turkey) was confirmed 29 years after the last observation. Nineteen specimens were found in three localities, situated two kilometers from each other, and located in karst dolines above the tree line between 1,840 and 1,950 masl. Active snakes were observed during daytime in the beginning of May, mid-July and the second half of September. *Vipera anatolica* is characterized by small maturation size in females (242–360 mm); gravid females were found until the middle of September. The simultaneous presence of pregnant and non-pregnant females in summer indicates that females may not give birth each year. Two neighboring mountain massifs within the altitudinal range of *V. anatolica* were visited, but additional populations were not found. Overgrazing seems to be the main threat to the species since the record localities were associated with low grazing activity and contrasted with potentially suitable habitats where high grazing pressure was present.

BOX TURTLES ON MAN-MADE ISLANDS

M. T. Jones et al. [2016, Journal of Herpetology 50(1):94-101] investigated the ecology, distribution, and density of Florida box turtle (*Terrapene carolina bauri* Taylor, 1895) populations in the Ten Thousand Islands (TTI), an estuarine mangrove ecosystem in southwestern Florida. The distribution and ecology of box turtles in this region and this habitat type have not been previously investigated. The study area encompassed 18 islands and included five natural islands, 13 man-made shell islands, and adjacent mangrove environments. Two hundred and twenty-nine live box turtles and 95 box turtle shells were detected a total of 409 times on seven of the 18 islands. The seven islands where box turtles were detected ranged in size from 7.3 to 31.0 ha and were ancient shell work sites, apparently constructed by the Calusa or other Prehistoric Indians approximately 1,900 to 900 years before present (ybp). Box turtles were not detected on natural islands. The authors detected box turtles primarily in subtropical hardwood hammock forests, but detected 10% of turtles in mangrove or mangrove ecotones. Males were larger than females across all sites. There was a significant difference in body size between living and dead adults. The authors estimated population size on four shell work islands to range from 43 (SE = 3.5) turtles to 270 (SE = 244) turtles and estimated densities ranging from 2.7–12.2 turtles/ha. Box turtles on the shell work islands of the TTI are a unique example of populations living on ancient, man-made islands. However, known populations are small and isolated and may be susceptible to increased human recreational use, mechanized vegetation management, or predation by raccoons.

LEAPING LIZARDS

R. D. Grabar et al. [2016, Herpetologica 72(1):32-39] note that jumping is one of the most common modes of locomotion for animals, and animals in the wild often jump off a range of substrates. They tested the effects of varying surface diameter (1 and 5 cm) on jumping performance and kinematics in two species of arboreal geckos (*Rhacodactylus auriculatus* and *Correlophus ciliatus*). Both are medium-sized (~10–15 g) geckos that readily jump off a range of diameters. Maximal jumps were filmed with a Photron high-speed camera at 500 frames $\cdot$ s⁻¹. Diameter had little impact on either jumping performance (distance) or kinematics (takeoff angle and speed, landing angle, jump duration), but mass had a positive effect on both jump distance and takeoff speed in *C. ciliatus*. Further, *C. ciliatus* exhibited higher takeoff velocities and tended to have greater jump distances compared to *R. auriculatus*. The factors causing this among-species difference are unclear, but differences in both tail morphology and how these species use their tails could partly explain this difference. This study confirms others which show that lizards are scarcely affected by diameter in terms of jumping, and the authors discuss some of the reasons lizards are able to effectively overcome this environmental challenge.

EFFECTS OF DENSITY ON GLASS FROG BEHAVIOR

N. F. Angeli et al. [2015, *Journal of Herpetology* 49(3):388-394] note that social behaviors often are context dependent; behaviors at high density may change or disappear at lower population densities. They analyzed spatial dispersion patterns and habitat associations at high and low population densities of male *Espadarana (Centrolene) prosoblepon* that declined following the invasion of a pathogenic fungus, *Batrachochytrium dendrobatidis*. They mapped the spatial location of male frogs on four permanent 200-m stream transects over 4 pre- and 7 postdecline yr. They calculated distances between nearest neighbors and between hot spots—defined as areas of high male density—and compared habitat associations of frogs at high and low densities. Average predecline density across transects was 0.034 ± 0.02 males m^{-1} (mean $\pm$ SE) and dropped to 0.019 ± 0.02 males m^{-1} postdecline. Nearest neighbor and between cluster distances did not change significantly between pre- and post-decline yrs. Nine of 21 hot spots persisted in the same location across 12 yrs, whereas 8 hot spots disappeared and 4 new hot spots appeared postdecline. Male abundance was correlated with the amount of leafy vegetation and stream width at high density, but no associations were found at low densities. Overall, spatial dispersion patterns were highly conserved for over a decade, despite a new cohort of individuals, a decline in abundance, and changes in physical structure associated with natural forest dynamics. These results suggest spatial dispersion is density independent and that male hot spots are influenced by both physical habitat and social interactions.

SNAKE BODY SIZE VERSUS COVER USE

P. T. Gregory and K. N. Tuttle [2016, *Herpetologica* 72(1):64-72] note that an animal's decision to stay in a protective refuge or venture from it will depend on the exigencies of other necessary functions (e.g., feeding, breeding, thermoregulation), which often will interact themselves. This study determined broad patterns of use of cover objects in five species of diurnal natricine snakes at two locations in Canada and one location in the UK. In particular, the authors focused on the influence of body size (larger snakes should incur less risk away from cover) and reproductive state (gravid snakes thermoregulate precisely and therefore should often bask) on the probability that a snake will be found in the open. As predicted, body size influenced the likelihood of being in the open, both within and between species (one small species was almost always found under cover), even when time of day, season, or both, were taken into account. Such relationships are unlikely to be solely caused by the thermoregulatory role of cover, and the authors argue that small snakes sometimes sacrifice basking opportunities to take advantage of the protective qualities of cover. However, small snakes might use cover to avoid dehydration as well as predators. As was also predicted, gravid females were more likely to be in the open at a given body size than other snakes, but only in the three largest viviparous species; the smallest species and one oviparous species showed no such effect. In general, body size and reproductive state both determine cover-use behavior. Studies of use of other kinds of cover or refuges by snakes (e.g., vegetation, underground burrows), and of time spent under cover vs. in the open, would help test the generality of these conclusions.

"CONSERVATION GRAZING" AND SMOOTH SNAKES

C. J. Reading and G. M. Jofré [2015, *The Herpetological Journal* 25(4):225-231] report that heathland in the UK, and parts of mainland Europe, is being managed increasingly by landowners and statutory conservation bodies (e.g., Natural England), using cattle grazing (often referred to as "conservation grazing") in an attempt to justify its use in the absence of any detailed prior research into its actual benefits for wildlife species whose individual habitat requirements are likely to vary. Between 2010 and 2013, cattle were excluded from six hectares of lowland heath that had been subject to annual summer cattle grazing between May 1997 and autumn 2009 and in which reptile numbers had been monitored annually since 1997. Changes in smooth snake (*Coronella austriaca*) numbers were recorded annually in the ungrazed area and in an adjacent 4-hectare area of heathland that continued to be grazed. The number of individual smooth snakes, and the total number of smooth snake captures, were significantly higher in the ungrazed heath than the grazed heath and were associated with increased habitat structure, resulting principally from tall heathers and grasses. The results of the study suggest that the use of cattle grazing as a management tool on lowland heath is detrimental to smooth snake populations and that their recovery, following the cessation of grazing, may take many years.

DEFENSIVE BITING IN MUD TURTLES

S. M. Peno et al. [2016, *Journal of Herpetology* 50(1):26-28] note that propensity for defensive biting in turtles should vary ontogenetically. In species with plastral kinesis, the effectiveness of retraction into the shell as a defensive mechanism increases with body size. Therefore, adults should be less likely to bite and more likely to retract than juveniles. The authors tested this hypothesis by measuring biting and retraction propensities from an ontogenetic series of *Kinosternon sonoriense* (Sonora mud turtle), a species with plastral kinesis. As predicted, biting in *K. sonoriense* was restricted to younger, smaller turtles, whereas capacity for retraction was restricted to older, larger turtles.

INTRODUCED REPTILE SPECIES IN SERBIA

A. Urošević et al. [2016, *Herpetozoa* 28(3/4):115-132] describe introductions of exotic species and range expansion of native species in Serbia. The four most important introductions are the alien, invasive *Trachemys scripta elegans* and native *Testudo hermanni*, *Mediodactylus kotschy* and *Podarcis muralis*, which expanded their ranges. *Trachemys scripta elegans* is of special concern, since introductions of this species can have numerous negative effects on local ecosystems. Incidental introductions were documented for two alien (*Pelodiscus* sp. and *Hemidactylus turcicus*) and two native species (*Podarcis tauricus* and *Vipera ammodytes*). The greatest number of introductions is concentrated around urban areas, especially around the cities of Belgrade and Novi Sad. Increased traffic, trading and cargo shipment, as well as a large number of people who keep exotic animals as pets, make large urban areas susceptible to accidental and deliberate introductions of amphibians and reptiles. On the other hand, anthropogenic alteration and degradation of habitats, along with increased urbanization, can provide corridors for the range expansion of native species.

RARE GECKO FOUND ON MAINLAND NEW ZEALAND

M. Barry et al. [2016, Journal of Herpetology 50(1):77-86] note that the largest extant New Zealand gecko, *Hoplodactylus duvaucelii* (Duvaucel's gecko), is a nocturnal, viviparous species of conservation concern. Once widespread throughout New Zealand, this gecko is now confined to offshore islands, the majority of which are free from all introduced mammalian predators (mice, rats, cats, mustelids, brushtail possums). A single *H. duvaucelii*, caught within a fenced reserve on North Island in 2010 was genotyped to determine whether it represents a recent introduction or a previously unknown native relict population. Genotypes from seven nuclear loci and a minimum spanning network of mtDNA haplotypes revealed two clusters representing southern (Cook Strait) and northern island populations. This genetic structure is concordant with variation between these two groups observed in body size, color pattern, and scalation. The mainland specimen was found to possess a mixture of morphological character states typical of northern and southern island populations. Although the individual possessed a unique mitochondrial haplotype, high heterozygosity, and a private nuclear allele, it was no more genetically distinct than conspecifics from isolated island populations. Comparisons with live captive geckos failed to provide evidence that the aberrant specimen represented a recent translocation. The authors infer that *H. duvaucelii* has survived naturally on North Island at very low population densities since the human-mediated introduction of novel predators 800 years ago. Our findings suggest a novel conservation priority, which should be prioritized for additional study in the immediate future.

SURFACE ACTIVITY OF HOG-NOSED SNAKES

S. W. Buchanan et al. [2016, Journal of Herpetology 50(1):17-25] note that snakes, as ectotherms, rely heavily on environmental temperature to drive physiological processes. Activity in terrestrial snakes is influenced heavily by environmental temperature, but climatic, temporal, and ecological factors play a role as well. Understanding when and under what conditions a species is most likely to be active on the surface can be important when dealing with a cryptic species and a species that occurs at low densities. Surface activity, body temperature (T_b), and microclimatic data were collected during a study of 17 *Heterodon platirhinos* in an early-successional sand-dune ecosystem from 2009 to 2011 using temperature-sensitive radiotransmitters. Mean T_b (27.9°C , $\text{SE} = 0.24$) and T_b range ($5.5\text{--}39.5^{\circ}\text{C}$) were similar to those reported in other studies of *H. platirhinos*. Females were generally more active than males, except in September when males may be searching for mates. Mixed-effects logistic regression was used to assess the relationship between snake surface activity and selected microclimatic and temporal variables. Hours postsunrise and relative humidity emerged as the top variables influencing surface activity in gravid females. Hours postsunrise and ambient air temperature emerged as the top variables influencing surface activity in males. The data suggest that activity in *H. platirhinos* occurs as a function of several environmental, temporal, and ecological factors and varies on the basis of sex and reproductive class. When considering activity, future studies on terrestrial ectotherms should consider not only the relationships of sex, but of reproductive class as well.

EFFECTS OF ROAD CHARACTERISTICS ON LIZARDS

K. A. Hubbard et al. [2016, Journal of Herpetology 50(1):29-36] note that as road networks continue to expand globally, indirect impacts to adjacent wildlife populations remain largely unknown. Simultaneously, reptile populations are declining worldwide and anthropogenic habitat loss and fragmentation are frequently cited causes. The authors evaluated the relative influence of three different road characteristics (surface treatment, width, and traffic volume) and habitat features on adjacent populations of northern sagebrush lizards (*Sceloporus graciosus graciosus*), plateau fence lizards (*S. tristichus*), and greater short-horned lizards (*Phrynosoma hernandesi*) in mixed arid shrubland habitats in southwest Wyoming. Neither odds of lizard presence nor relative abundance was significantly related to any of the assessed road characteristics, although there was a trend for higher *Sceloporus* spp. abundance adjacent to paved roads. *Sceloporus* spp. relative abundance did not vary systematically with distance to the nearest road. Rather, both *Sceloporus* spp. and greater short-horned lizards were associated strongly with particular habitat characteristics adjacent to roads. *Sceloporus* spp. presence and relative abundance increased with rock cover, relative abundance was associated positively with shrub cover, and presence was associated negatively with grass cover. Greater short-horned lizard presence increased with bare ground and decreased marginally with shrub cover. These results suggest that habitat attributes are stronger correlates of lizard presence and relative abundance than individual characteristics of adjacent roads, at least in this system. Therefore, an effective conservation approach for these species may be to consider the landscape through which new roads and their associated development would occur, and the impact that placement could have on fragment size and key habitat elements.

IDENTIFYING INDIVIDUAL WYOMING TOADS

T. A. Morrison et al. [2016, Journal of Herpetology 50(1):44-49] note that monitoring the fates of individuals after release in the wild is essential for building effective species recovery programs. Current conservation efforts for the endangered Wyoming toad (*Anaxyrus baxteri*) are limited by the size and number of toads that can be individually marked using invasive tagging techniques. The authors evaluated the use of natural patterns of wart-like glands on the dorsum of Wyoming toads as a potential identification technique. They photographed 194 known-identity individuals (822 total images, representing 1,554 true matching-image pairs of the same individuals) from two captive-breeding facilities in 2011 and 2012. Spot patterns provided stable markings from metamorphosis through adult life stages, and naïve observers correctly matched 100% of a subset of photo pairs "by eye." In contrast, computer-assisted identification performed relatively poorly: the two software platforms tested (Wild-ID and Hotspotter) failed to match 47% and 64% of true matching-image pairs, respectively. The use of higher-quality cameras with faster automatic focusing speeds yielded the largest improvement in matching success of any variable tested when using identification software. Simulated capture-recapture data demonstrated that using software to identify individuals would bias abundance estimates high by up to 920%.

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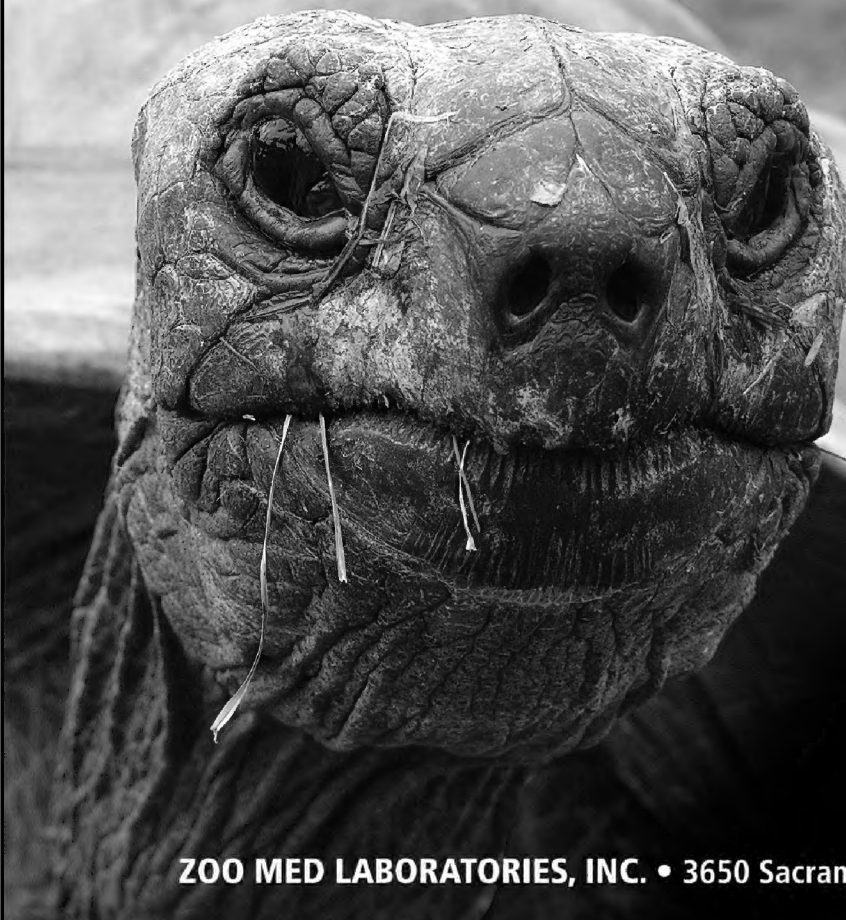
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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, April 27, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **George L. Heinrich**, a field biologist and environmental educator specializing in Florida reptiles, will speak on "Turtle Science: Why Turtles Are Cool." This presentation will introduce the fascinating world of turtles and turtle science.

At the May 25 meeting, **Chip Cochran** will speak about chameleon conservation.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, May 13, 2016, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

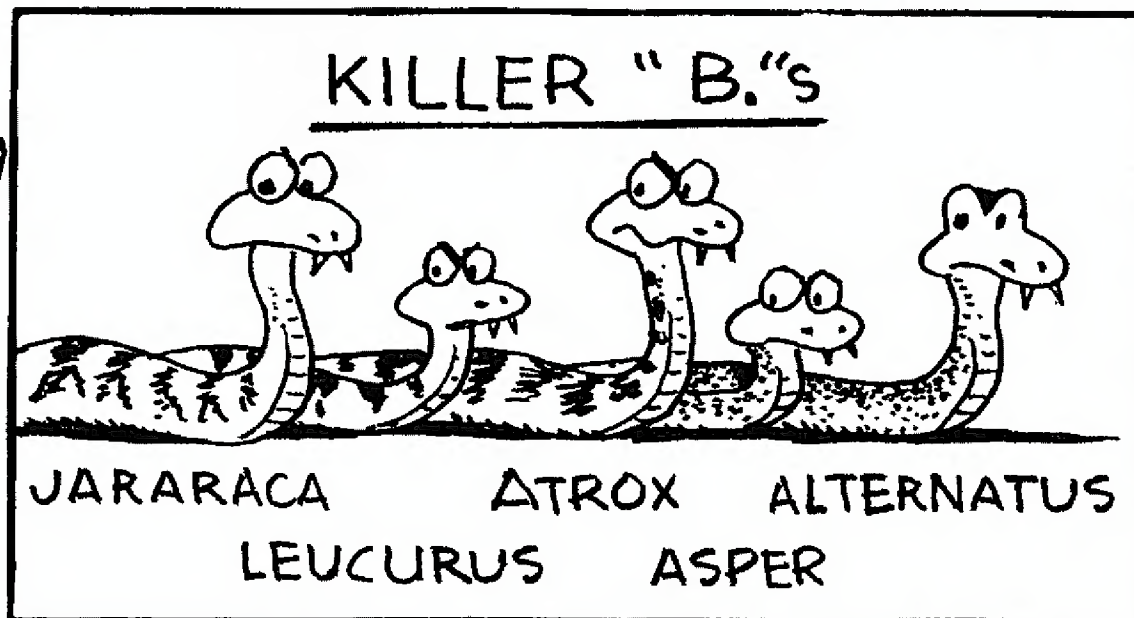
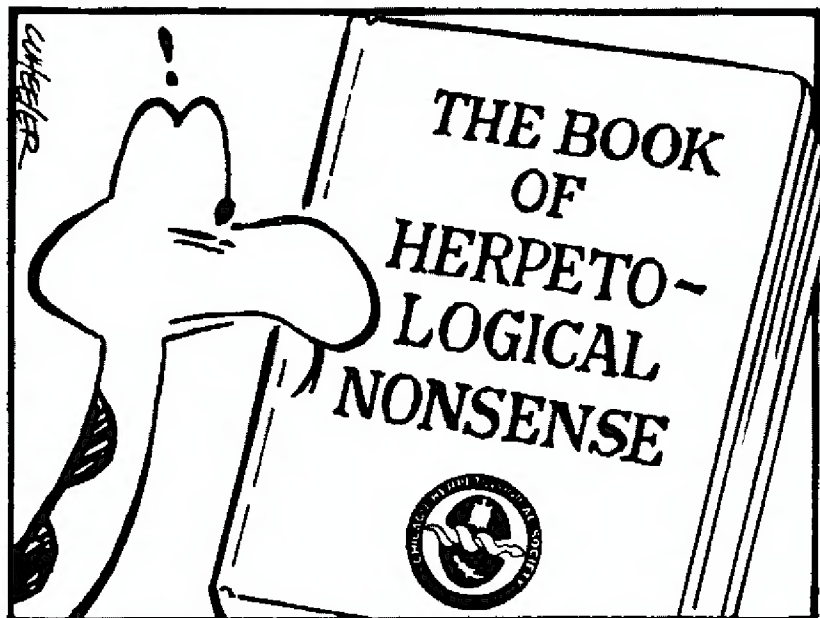
The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

REPTILEFEST 2016

Many who might read the *Bulletin* don't know about ReptileFest, so here's a little about it. For 23 of our 50 years as the Chicago Herpetological Society we have assembled a group of people and animals once a year and tried to educate the public about herps. We try to have ReptileFest reflect your Society's mission of education, conservation, and cooperation between professionals and hobbyists. Obviously the original idea was a good one, because over the years ReptileFest has grown. This year, in spite of having to cancel last year's ReptileFest, we had a record crowd --- 7500 people over two days were drawn into a 35,000-square-foot gymnasium full of fantastic animals and dedicated exhibitors. No animals were for sale. We are the largest educational reptile and amphibian show in the country, and we don't want to compete with the commercial shows. Our goal is to educate, and the passion and knowledge of the exhibitors allow us to do just that.

Pictures beat words if you want to get a feel for the event, so we suggest you simply google "ReptileFest." But if you do so, certain things won't appear in any of the photos, videos or newsreels that pop up. You won't see the excitement of the visitors or of the exhibitors, volunteers, university staff, or invited guests. If you had been there you'd know that one can bask in the energy generated by thousands of people exploring, touching, talking and sharing. We have veterinarians answering questions and dealers not selling but lecturing. We have kids sharing the joy of owning a bearded dragon, high school students presenting the need for conservation, and parents overcoming their fears. You won't see the curiosity or the fascination. The hard work and dedication is not visible. And no matter how much you chase after the links on Google, you won't notice the exhaustion at the end of the weekend as exhibitors take home their animals and put the animals and themselves to bed. It's hard work, and we ask hundreds of people to bring many hundreds of animals to share with thousands of visitors. And they do it. Because it's fun. Even though they're on their feet for hours. Even though their knees hurt from bending down to the children. Even though they're losing their voice by the end of the show and still have to break down, pack up, and go home. They do all that for lunch and a T-shirt. We're in awe. Thanks! See you next year.

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